

## IMPLEMENTING OPERATIONS MANAGEMENT IN MANUFACTURING COMPANIES

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### ABSTRACT

**Purpose:** This paper explores to provide a picture of the existing research and suggest potential chances for academic enquiry in connection to the operations management.

**Design/methodology approach:** The researchers reviews the existing literature at the heart of the operations in manufacturing company. This literature link up to operations system in order to review the current state of thought development across the disciplines (ERP, TOC, JIT, VAE, Lean Six Lean Sigma, etc. Suggestions have been made for future research in those areas opportunities.

**Findings:** The findings show that the extant literature is primarily based on operations system rather than integrated approach. In addition, the findings suggest on the best way the operations systems could be implemented in the manufacturing companies by the operations managers. The findings consider several areas of prospects for future inquiry.

**Practical Implication:** This paper can be used by operations managers in manufacturing companies as well as service organizations.

**Originality/Value:** This paper build on our knowledge on operations management in manufacturing companies as it relates to key elements of operations disciplines that had been previously used in literature to buttress the exiting literature in the paper and identify research opportunities.

**KEYWORDS:** ERP, TOC, JIT Purchasing, TQM, VAE, Balance Scorecard, Continuous Improvement, Lean Manufacturing, Agile Manufacturing, Leagility, Six Lean Sigma, Project Management

**Received:** Apr 21, 2016; **Accepted:** May 11, 2016; **Published:** May 07, 2016; **Paper Id.:** IJBMRJUN2016011

### INTRODUCTION

Due to the market complexities in the fast moving consumer goods (FMCG) in the manufacturing sector there has been the need for the service of operations manager as a recognised profession in assisting the company to resolve some challenges facing them to enhance their corporate strategies while persistently maintaining their competitive advantage (Tiwari et al., 2007). However, the likely challenges identified in some companies for resolution by operations manager touches on delivering product quality, performance driven across a balanced set of metrics, delivering manufacturing strategy via large team in the fast paced and pressurised environment,

managing goods in through to despatch, delivering varied customer service across and global customer base for the company, managing entire manufacturing process and accountable for driving cultural change in the company. In view of this, techniques and tools within the theories that need to address the aforementioned challenges involves total quality management (TQM), lean six sigma, Just- in time (JIT), enterprise resource planning (ERP), agility manufacturing, lean manufacturing, balanced scorecard of key performance indicators and continuous improvement as a guide for future research.

Operations managers have argued that the significance of the strategic operations in the manufacturing sector to function well, there should be the development of the cooperation strategy in order for the operations manager to perform creditably in a global market (Hayes et al., 2004, Bayraktar et al., 2007). The significance of the operations effectiveness is to integrate manufacturing with the other functional areas in order to improve company competitiveness (Paiva & Vieira, 2009). To achieve that, there should be a cross functional integration in order to align company strategic decisions to the international operations levels (Ward et al., 1994 cited in Paiva & Vieira, 2009). Operation strategy is considered to be the best use of operations capacity and technology in order to achieve business and corporate goals (Yu & Ramanathan, 2012). Strategic significance in the operations management effectiveness focussed on varieties of themes such as costs, operations location, logistics, quality systems or productivity (Prasad & Babbar, 2000 cited by Paiva & Vieira, 2009). The appropriate operation strategy will eventually lead to profit maximisation, customisations, creativity and innovation, quality, flexibility, quick response, reliable delivery and better after sale service (Ahmed et al., 1996 cited in Yu & Ramanathan, 2012). If the best operations strategy is used will eventually lead to reduce manufacturing difficulty that will easily be coordinated in the cross functional levels to enable the operations manager to add value in the company.

According to Greasley (2009) operations process is a way of transforming a set of input resources into outputs of products and services. Greasley emphasis that transformational process that involves physical raw materials are relatively easily to identify. For instance, when transforming milk into cheese and butter. Figure 1 indicates arrows labelled transformational system as a model on how an organisation meets their customer needs through the production of goods and services. This can be applied on both profit and non- profit making organisations with the aim to maximise the quality of the company transformation processes to meet customer needs (McCubney et al., 2010).

Tuckman (1965) five stages group development model involves forming, storming, norming and adjourning (Tuckman & Jensen, 1997 cited in Akan 2005). Forming stage is where the group depend highly on leader for guidance and direction, identification of tasks methods, rules are unclear, resource and information are acquiring. The second stage is forming where there are internal conflict within group members on decisions making, thus high rate of task resistance at this stage. Norming stage is the third stage where conflicts have been settled, strong commitment or resolved on the roles and the responsibilities which group members are clear and accepted. Performing stage is the fourth where the team is achieved with flexible roles and are strong with no interference from the leader, focus on goals achieving and most of the decisions are against collectively agreed criteria. The fifth stage is adjourning where the group dissolved when everyone is feeling good that task has been completed successfully. The benefit of this framework is that new workplace organised through flat structure networks of team members drawn from competitors, suppliers, customers which normally perform unique task like a project by project basis (Akan, 2005). As operations managers' are tasked to perform additional role as a team leader in the supply chain members, aforesaid model will serve as a benchmark when given such a role to perform for the betterment of the manufacturing company as future opportunities for them.

Managing project successfully has become a headache to operations managers which a basic knowledge at least will help to avoid delays and waste of resources in project. Project management is the way of developing a project plan that involves defining and confirming the goals and objectives of the project, identifying tasks and how those goals will be achieved, quantifying the required resources and determining budgets and timeliness for accomplishment (Reh, 2012). Reh stated that successful project management is based on the four fundamental elements such as resources, time, money and the scope. However, for project to be managed successfully, all those elements must be managed together. Further, the resources for project involves people, equipment, and materials while time include task, duration, dependencies and critical path. Similarly, money focussed on costs, contingencies and profit while scope involves project size, goals and requirements (Reh, 2012). The project scope is what defined the project completion and the budget of time and money that has been designed in order to achieve these objectives. Proper identification of project scope with its associated timeliness and budget will lead to start managing the project resources. The resources involve the people, equipment and materials that required completing the project successfully (Reh, 2012). According to Reh project management tools involve brainstorming, fishbone/Ishikawa diagrams, critical path analysis (CPA) flow diagrams and gantt chart. CPA is specifically designed for identifying related interdependent activities and events in the project. CPA flow diagrams are very vital for indicating interdependent elements plan to schedule according to a timescale, costing, and budgeting and to identify casual elements. Henry Gantt models assist in scheduling, budgeting, reporting, presenting and communicating project plans and progress easily and quickly which has become mandatory for operation manager to research future.

The theory of constraints (TOC) has been area of interest to operations managers to consider in order not to focus only on services organisations. By definition, TOC “is an overall management philosophy that recognises constraint on any system restricts the maximum performance level that the system can obtain in relation to its goal (Siha, 1999). According to Siha the goal of most services and manufacturing companies is to make high profit now and future which the constraints has been keeping the company from making a high profit and need attention or services of the operations manager to adopt the TOC to remedy such challenges for continuous improvement. However, three global performance measures developed include throughput, inventory and operating expense (Goldratt & Cox, 1992 cited in Siha, 1999).

From manufacturing perspective, throughput is the way the system makes money through sales while inventory is meant for all the funds spent in buying items the system targets to sell whilst operating expense focus on all funds the system invests in transforming inventory into throughput (Siha, 1999). In responding to that, throughput and operating expense are appropriate measures for most services while inventory may not be applicable for all services industries or businesses. Siha (1999) stated that continuous improvement is the element of five-steps focusing process of the TOC philosophy that must be adopted on system constraints for improvement in performance to identify, exploit, subordinate, evaluation and return to step 1. The five steps are generic that are applicable to any system without exemption of service industries. The first steps is to identity the system constraints as a system that cannot easily be managed at highest performance level unless we know exactly what constraints the system have so that we can plan the best methods to the constraints whilst the second step seeks to exploit the system constraints that are best possible to make use of the constraints. The third steps are to subordinate the non constraints. Fourth steps was to elevate the constraint after finishing the above steps, while further improvement in performance of the system need to change constraints. The fifth step is to return to step 1 after constraint is transformed, new system constraints may develop. For that reason, return to steps 1 aim to identify new constraints.

According to Pegels and Watrous (2005) the aim of the manufacturing company is to improve the performance of the manufacturing company by adopting the TOC principles to progressively strengthen the chain by the way of identifying and strengthening the weakest link. TOC is a productive improvement tool in industries where there is a requisite needs to identify and focus on bottlenecks in operations as a source of interruption in an attempt to improve productivity and throughput. Further, it is confirmed that if the bottlenecks in any operations are completely eliminated, considerable improvement will therefore follow exactly. It is more significant for operations manager using TOC to clearly identify the bottleneck and then take the necessary action to eliminate such bottleneck. In practice, the successful implementation of the TOC is to identify the weakest link in the domain of an industry and to find a way to “strengthens this link to the point where it is no longer the limiting factor in determining the strength of the chain ...” (Pegel & Watrous, 2005:3). TOC is considered to be continuous improvement process, because there is at least a constraint that prevents an organisation from becoming a little better, no matter how good a company performs. Operations managers have observed that manufacturing company can implement TOC to achieve the goal (profit) if they increase the overall system of throughput while simultaneously reducing inventory and operating expenses. This could be a benchmark to operations managers as a propose research opportunities to focus.

## **DELIVERING PRODUCT QUALITY**

Delivering product quality has been as a strong challenge facing companies which failure to address will lead to loss of profit and market share (Sharma & Chetiya, 2012). Product quality could however be achieved through the adoption of some of the management systems and tools such as total quality management (TQM), lean six sigma, kaizen, quality control, JIT, zero defect, quality assurance, quality management and business process re-engineering (BPR) that lead to improvement and maintenance of quality in the company through the supply chain which have been selected to address the challenge facing companies to discuss later (Tiwari et al., 2007; Burt et al., 2012; CIPS). Based on delivering product quality as a challenge, quality assurance and DMAIC as tools required to link TQM and lean six sigma to achieve product quality respectively. Since inception of quality researchers have proposed numerous competing definitions which the most appropriate to this article have been highlighted. By definition, quality is “fitness for purpose or suitability” (Baily et al., 2005; p.108). TQM is “philosophy and a set of guiding principles that represent the foundation of a continuously improving organisation” (Besterfield et al., 2003: p.3). According to Sun and Zha (2010) TQM encompasses all quality that focuses on management approach to providing products and services that satisfy customer requirements. TQM focuses on the systems, procedures and processes rather than goods and services being supplied (Baily et al., 2005). TQM lead to improve customer satisfaction, enhance delivery time, quality of goods and services, inventory and waste reduction, improved productivity, better human resources utilisation whereas is being critic to be of creating cumbersome bureaucracy into the quality documentation while some of managers assumed TQM as management by stress and as the same time de-unionising workers (Kenneth & Farrington, 2006).

From research perspective, for TQM to be achieved successfully companies need to accept by applying the appropriate tools and techniques having known the type of production and service that the company provide which can improve the firm business results (Burt et al., 2012; Ahmed & Hassan, 2003). In practice, quality assurance (QA) is a system and procedures that ensure conformance and performance and also lead to defect prevention (Kenneth & Farrington, 2006; CIPS, 2003; CIPS). QA approaches involve quality system (ISO 9000), new design control with the aim at getting it first time design of manufacturing process for removing defects at source, incoming materials

control and supplier appraisal for supplier approved in meeting quality requirement especially when adopting JIT purchasing (Kenneth & Farrington, 2006; CIPS). The company need to strictly adhere to the utilisation of the ISO 9000 series certificate from the supplier as a kind of assurance to the purchasing company of goods or services supplied by the supplier are meeting their quality requirements to avoid further inspection which add to cost to the company (CIPS, 2003). Moreover, the operation managers must encourage management of the company to adopt QA that is certified by ISO 140001 and ISO 9000 standards which must continuously adhere to the requirements of ISO body by the company to enable customers to perceive our goods and services as being of good quality to gain high product reputation by the company (ISO, 2002 cited by ....). By so doing, the company will go a long way to gain their local and global competitiveness for trustworthy of the company (IMD, 2002 cited in Da Silva et al., 2005). The operations managers should note that despite the success of some industries implementing total quality management (TQM) there have been disadvantages due to companies considering at the initial start- up stage of the TQM programme as a motivational programme while simultaneously expect immediate responses without strongly considering TQM as a long- term and continuous programme (Walsh et al., 2002 cited in Mokhtar & Yusuf, 2010). According to Teschler (2006) TQM can only be successful if the company top management implement the system correctly with well defined expectation. In addition, TQM worthwhile in implementing the system only if the top management support the operations manager, the company will become a world class manufacturing company as a result of reducing operational cost, increase visibility to business performance, good quality product, satisfy customers and reduce time to market (Burt et al., 2012; CIPS).

Operations managers has been advising that for product quality to be improved, satisfying customers and cost reduction there is the need to employ in the company value analysis (VA) and value engineering (VE). VA and VE can help for product quality with the aim for better performance at relatively lower cost without impairing all functional requirements stated by the customer (Sun & Zhao, 2010). However, VA is meant for identification of cost reduction technique whilst Value engineering (VE) focuses on cost avoidance technique (Sun & Zhao, 2010). In practice, those are applicable already in production that is used for analysing product specification requirements that appeared in the purchase request and production documents (worker orders) which operations manager must adopt those because it leads to new product development, which a lot of the industries profit and sales are generated from the new products.

Lean six sigma is a business strategy that assists firm to provide method to speed decision making processes of the company whilst reducing production inefficiencies and increasing product quality that lead to sustaining operational excellence or performance (Harry & Schroeder, 2000; Sharma & Chetiya, 2012; Arnheiter & Maleyeff, 2005). Adoption of lean and six sigma will automatically improve companies quality product through designing and controlling day to day business activities in order to minimise waste and resources whilst ultimately increasing customer satisfaction (Kaushik et al., 2012) increase market share (Sharma & Chetiya, 2012) while offering benefits to the business unit (Abeoelimged, 2011).

Lean six sigma is very significant to manufacturing companies as a way of combining value focus lean and practical together with six sigma data driven (Arnheiter and Maleyeff, 2005; Kumar et al., 2008). However, some researchers have advocated that six sigma is broken down into seven parameters such as DMAIC (Hoerl, 2004), six sigma company (Hoerl, 2004; Bergman and Klefsjo, 2003; Magnusson et al., 2003), six sigma toolbox (Magnusson et al., 2003), variation reduction (Nave, 2002; Na'slund, 2008), focus in customer (Bergman and Klefsjo, 2003), decisions making on facts (Goh and Xie, 2004) and focus on bottom line (Goh, 2002). Comparatively, lean also focus on four concepts such as

lean techniques and tools of value stream mapping (Womack, 2006; Alukal, 2003), involvement of individuals (Holbeche, 1997 cited in Assarlind, 2012), continuous improvement (Ricondo and Viles, 2005) and waste elimination (Spector, 2006; Alukal, 2003; Na'slund, 2008). Notably, operations managers must letting their company to understand that implementation of six sigma lead to uniform process output while lean is to reduce flow time (Assarlind, 2012). The combination is beneficial as a result of focusing on flow, value streams, reduction of waste, reduction of variation via structured problem solving and application of statistical techniques and tools (Assarlind, 2012). According to Assarlind (2012) lean six sigma integrate into one concept and to the simultaneous usage of both concepts independently. It is recommended by the researchers that six sigma lead initiative and introducing lean principles assist the analysis phase to the best result (Hoerl, 2004; Assarlind, 2012). It was emphasised by Ferng and Price (2005) that lean should have standard and adoption of six sigma will without doubt help to investigate and remove variation from this standard.

With the combination of lean six sigma as incorporated as one entity DMAIC (define, measure, analyse, improve, control) cycle can be used to handled all types of improvement activities to accommodate variety of requirements and purposes (Burt et al., 2012; Assarlind, 2012) while all black belts must be trained in both lean and six sigma in order to achieve the best result (Assarlind, 2012). Six sigma that focuses on DMAIC lead to bottom line results (Goh, 2002). The numerical goal of six sigma in the manufacturing sector will lead to the reduction of 3.4 defects per million opportunities (DPMO) as a way of reducing recycle time and costs reduction which impact the bottle line results (Goh & Xie, 2004; Sharma & Chetiya, 2012; Karthi et al. 2011). Its drawbacks includes inadequate selection of six sigma projects, lack of support internally, inadequate resources, limited organisational structure (Snee, 2001) while there is barrier of six sigma implementation obstruction (Aboelmaged, 2011). The adoption of the two models will lead to the achievement of zero defect production in manufacturing companies that will harmonise removal of non value adding activities as an advantage (Bellows, 2004; Gnanarajet al., 2010). To accept lean six sigma, contributions have been made towards the selected facets of lean and six sigma of the best implementation of the business to achieve product quality (Assarlind, 2012). However, business strategies used for this challenge are superb to be advised in order to achieve company's performance, quality product and customers' satisfaction for manufacturing companies (Lagrosen, 2001). Establishment of this ideology can be earmarked to provide direction as future research opportunities focussed.

### **Driving Performance across a Balanced Set of Metrics**

Operations managers have been tasked high performance in their professional in order to survive in manufacturing companies as a result of high competition in the market. The situation has called for driving performance across a balanced set of metrics as a challenge that require to address in order to achieve business performance successfully (Niebecker et al., 2010). Balanced scorecard and continuous improvement are proposed strategic business techniques to address the performance management of the company business core competences. Company performance measurement will be addressed on the balanced scorecard of key performance indicators for future success (Olive et al., 2000). Balanced scorecard is the use of non- financial performance measures through the four distinct business perspectives namely customer, internal business process, and learning and growth to supplement traditional financial measures (Kaplan & Norton, 1996a; 1996b) (see appendix 1). Balanced scorecard "... method for reaching agreement where an operation should be heading and for making sure that it stays on course" (Olive et al., 2000; p.4). The purpose of this challenge is to consider how the future business success and the use of vision and strategies that will be linked to non- financial and financial performance measures of the manufacturing company (Sim & Koh, 2001). Balanced scorecard

enhance the operations manager vision and strategy to daily manage those business perspectives, concepts and set of improvement plan of those areas to find better techniques for improvement of the company strategic goals on how their competitive position will be in future (Da Silva et al., 2005; Kaplan & Norton, 2001), how the company can be successful to create and sustain in their world class companies (Da Silva et al., 2005) and the way of managing business project and internal business that are associated with company core values and organisational practices (Niebecker et al., 2010; Stewart, 2001).

The idea of selection of the metrics should be supported with company objectives and emerging area of the balanced scorecard of its four interlinked perspectives stated above (Basu et al., 2009). The company should note that selected metrics should be validated, well defined and accepted by users to enable the work to be effective in managing the business (Basu et al., 2009; Kaplan & Norton, 2001). The success of the metrics will depend on effective collection of data and monitoring systems in place (Basu et al., 2009). Application of balanced scorecard and key performance indicators (KPIs) selection will definitely have influenced on some companies primary factors in relation with the above criteria for good performance measurement (Niebecker et al., 2010; Kaplan & Norton, 2001). In this direction, each indicator will be measured base on “ a target for both the current year and the best in classes for the future success” of the company (Basu et al., 2009; p.3) to increase the concept effectiveness of the business performance (Niebecker et al., 2010). Selection of KPIs are focussed on high level indicators that lead to major business project requirements, making sure that stakeholders are identified, benchmarks and requirements are agreed, plan for inspection and test are ascertained to get them right time for work to be completed successfully (Basu et al., 2009).

Operations managers have advocated that company future success on performance management can also be managed through continuous improvement (kaizen) for sustainability of the manufacturing company as a management system (Hiroaki, 2002; Collin, 2001). This gap will leads to how successful manufacturing companies will contemporary create and sustain their competitive advantage or excellence (Da Silva et al., 2005). Continuous improvement means to Japanese as kaizen which can be used to handle market pressure in sustaining competitive advantage for innovation for product development (Sun & Zhao, 2010). Kaizen can be defined as “on -going improvement involving everyone top managers and workers” (Imai, 1986 cited in Sun & Zhao, 2010; p.4). For global dynamics reason, it is to recommend kaizen as a management strategy to reduce the life cycle of product, simplifying the development process and increasing the product quality lunched to make the product market place faster (Sun & Zhao, 2010). Following the Imai philosophy of kaizen it is a long term and long lasting improvement that is achieved from team efforts concentrating on processes. However, kaizen leads to less investment because it uses the existing workers but it setbacks lead to adequate internal effort to maintain the system (Burt et al., 2012). For instance, Intel Company has been using continuous improvement which simplified their processes of existing and new product development that led to better quality and lower price as a performance measures for success which manufacturing companies are advised to implement (Sircanci & Durmaz, 1999 cited in Sun & Zhao, 2010). For this scenario, building up kaizen in good culture that “continuous improves every process, every procedure in any aspect, help push the company to success” (Sun & Zhao, 2010; p.5). On this note, all the business techniques selected are suitable with regard to the challenge facing manufacturing companies for implementation of balanced scorecard of well identified KPIs will lead to excellence business performance in future success that require the enforcement of the top management team and the operations managers in the company which has been advised on future research enquiry (Niebecker, et al., 2010; Basu et al., 2009).

**Delivering Site Manufacturing Strategy**

Global competition on environmental pressure has been challenging on operations managers finding the best manufacturing strategies to adopt to reduce them for competitive advantage. As a result, operations managers have identified that delivering site manufacturing strategy via a large team in a fast paced with pressurised environment need special attention which failure to solve this will inevitably affect the manufacturing company global competitive advantage (Lin et al., 2006; Swafford et al., 2006; Lee, 2004). However, emphasis will be on agile manufacturing and lean manufacturing strategy in addressing this particular challenge. Research has indicated that fast moving consumer goods (FMCG) in manufacturing environment has changed over the last two decades due to complexities in market conditions, technology and customers' needs transferring at unprecedented fast and turbulent direction has been a tremendous challenge to operations managers that need to adopt agile manufacturing strategy (Vandequez-Bustelo et al., 2007; Yusuf & Adeleye, 2002). Agility manufacturing is very significant for existing and new production model success due to the environmental changes (Yusuf & Adeleye, 2002; Ismail et al., 2006, Lee, 2004; Gligor & Holcomb, 2012). This proposed production model is considered to be effective as a result of necessary condition for competing in the future market (Hormozi, 2001) as being flexible to cope with rapid changes in the FMCG business environment (Lee, 2004; Swafford et al., 2008) speed with its associated quality designed product to customers (Gunasekaran 1998 cited in Gligor & Holcomb, 2012) but also considered as expected quality services by customers (Jin-Hai et al., 2003; Gunasekaran & Yusuf, 2002) and can achieve the increasing demands and well informed customers' requirements (Vandequez-Bustelo et al., 2007) considered to be the final need for world class performance in manufacturing (Hormozi, 2001; Yusuf & Adeleye, 2002). In this scenario, agile manufacturing predominantly aims to align the lean manufacturing efficiency for the operational flexibility as a result of the flexibility model in order to deliver customer requirements at a relative low cost of mass production (Adeleye & Yusuf, 2006; Gunasekaran & Yusuf, 2002; Swafford et al., 2006). Many authors contributed that manufacturing can be agile if the company could efficiently change operating states in order to be responsive to a changeable business environment conditions that exists (Narasimhan et al., 2006) while exploiting in a volatile or turbulent market condition for profitable opportunities (Dahmardeh & Banihashemi, 2010; Agarwal et al., 2007; Braundscheidel & Suresh, 2009; Gligor & Holcomb, 2012) consistent supply of highly products at a relatively lower cost at the same time achieving customer loyalty, better quality service and shorter delivery times, generating high market share, and increasing manufacturing competitiveness (Jain & Jain, 2001; Gunasekaran, 1999a, b).

The researchers have made clear that an event of adopting leagility as a hybrid of lean and agile manufacturing (Christopher & Towill, 2000), the company should know clearly when to apply them appropriately having studied the market environment of stable for lean manufacturing while unstable situation for agile manufacturing due to its operational and strategic responsiveness (Vandequez-Bustelo et al., 2007; Christopher, 2000; Dahmardeh & Banihashemi, 2010; Christopher et al., 2006). In practice, lean manufacturing will lead to an enhancement of mass production model whilst agile manufacturing consider to breaking mass production for extremely products (Jin-Hai et al., 2003). Lean operations is "a systems of work organisation that strives to deliver high quality, low cost products through the efficient use of resources and the elimination of waste" (CIPS, p. 222). Agile manufacturing has resolved the production model of limitations that lean manufacturing possess (Yusuf & Adeleye, 2002; Adeleye & Yusuf, 2006). By definition, manufacturing agility is the capability of a firm to cope with the changing market needs, increasing the level of customer service with the primary aim of being global competitive in a market and increasing the opportunity of long term survival and profit prospective (Gunasekaran & Yusuf, 2002). With regards to this challenge, agility manufacturing could be the



best operational strategy to adopt as being used by a lot of companies following the discussions above due to technology complexity and unpredictable market conditions of the industry in order to gain customer loyalty which need further research (Vandequez-Bustelo et al., 2007; Christopher et al, 2006).

### **Managing of Goods in Through to Despatch**

Managing of goods in through to despatch in order to streamline purchasing, inbound logistics, operations and outbound logistics in the company has been a headache to the operations managers in selecting the best management techniques suitable for the manufacturing companies (Johnson et al., 2008). The research has indicated that the challenge is possible to resolve through the implementation of inventory management techniques on kaban, consignment stocks, vendor managed inventory (VMI), JIT, material requirements planning (MRP) (Burt et al., 2012; Keneth & Farrington, 2006). However, techniques propose to employ will centred on JIT purchasing and enterprise resource planning (ERP). For operations manager to perform creditably in managing the inventory there should be the need to adopt JIT purchasing to achieve lower appreciable stock levels to enhance continuous operations (Han et al., 2008). The traditional approach of inventory must be phased out and implement JIT approach in order to save cost while meeting manufacturing process without stoppage based on the certain reasons (CIPS, 2003; CIPS). The traditional approach of purchasing that leads to high capacity utilisation which successful implementation of JIT approach will lead to lower capacity utilisation. The idea of purchasing more at each stage of the traditional approach can be eliminated and adopt JIT approach for purchasing when required and reduced materials costs by large orders (Kenneth & Farrington; CIPS) (see appendix 2).

Enterprise resource planning (ERP) is very important “development from MRP as fully integrated business system that focus on MRPII, sales and marketing, finance, HR, CRM, installation, logistics”(CIPS; p.183). Dawson also stated that ERP is a system that combines all departments and functions across an organisation or firm to a single computer system that can purposely serve all those various department special needs.

**(Please further to MRP).** The system has encouraged many large companies in the major industry to the development of software for ERP such as Oracle, SAP, PeopleSoft and Baan which manufacturing companies that has not used any of them must start implementing one of them as being relevant (CIPS, 2003).The benefit of ERP include receiving an order electronically from customer, update the MRP system, issue the necessary purchase orders to supplier converting all transaction in the proper currency (Aghazadeh, 2003) also faster inventory turnover, improve customer service, reduce set up times, concentrate on best practice, coordination throughout supply chain and higher quality with fewer reworks (Kenneth & Farrington, 2006; CIPS). Further, ERP is very flexible enough to permit a customer to adopt only those elements required without purchasing the entire materials (Dawson, 2002). Its drawbacks in adopting ERP are very lengthy and highly costly, cost of maintenance is high and data mistakes are replicated throughout the system and focus on the operational decisions (CIPS; Burt et al., 2012; Kenneth & Farrington, 2006) but lead to an improvement in the ways people take orders, manufactured goods, ship them and bill for them which are possible to obtain value from the software (Dawson, 2002). Proper implementation of ERP will lead to integrate financial information, integrate customer order information, standardise and speed up manufacturing processes and reduce inventory by the effort of the operation managers in some manufacturing companies (Dawson, 2002). Technology management have influenced on the operations mangers performance as companies expect the operations managers to adopt operations strategy that aligned with technology strategy (Kurupuarachchi & Perera, 2010). JIT and ERP system are applicable to company with variety of product leading to “inventory balances, assembly orders, customers orders, engineering orders and changes, purchase

orders, payables, machine stop orders and receivables” (Aghazadeh, 2003; p.262). Based on this challenge, operations managers have voted for ERP strategy as being the best recommended to enhance the achievement of JIT purchasing and also to streamline the management of goods to despatch in manufacturing companies due to the nature of their business as an opportunity to establish future research (Burt et al., 2012).

### **Customer Services across Variation**

For global competition reason, operations managers have research into the best solution to achieve customer services across variation which need to be measures on the five key elements viz “brand awareness, brand associations, perceived quality, brand loyalty and other proprietary assets” (Aaker, 1991 cited in Kimpakorn & Tocquer, 2010; 3) that operations managers must liaise with marketing department as a focal point development of the product in order to satisfy the customers. According to Keller (2003) brand equity can be defined as a result of finding out the differences in customer reaction to marketing activity. However, customers assess service quality in terms of what they get and the way the service is delivered (Gronroos (2001). The theory of perceived quality can be measured based on service performance and customer expectation involving communication, access, courtesy, competence, creditability, responsiveness, reliability, security, understanding and tangibles, brand trust, brand differentiation, brand commitment and employee brand commitment (Parasuraman et al., 1998; Hopkins et al., 2005; Zeithaml et al., 1993; CIPS). Operations manager must be aware that customers are increasing demanding for satisfaction which should emanate from low prices, quick survey of high quality, different characteristics and unique needs that are customised (CIPS). In responding to that, if operations manager are able to team up with the marketing department, they can delight customers to increase profit for the company. Some of the operations managers have suggested that customers usually concern of varieties expectation standards in assessing desired service and adequate service (Zeithaml et al., 1993). From this perspective, desired service and adequate service depends on the zone tolerance. However, predicted service influences the position of desired service, adequate service and the zone of tolerance (Hopkins et al., 2005). It is noted that once these are known it will enable the operations manager and marketing manager to work hard to extra mile of their customer expectation (delight) hence achieving competitive advantage for the Company (Zeithaml et al, 1993).

Customer market failure must be identify on the supply side and on the merit goods that has been a problems, externalities and information challenges through target interventions which needs to resolve the market failure (Thailer & Sustein, 2009). Information on both supply side and demand side to the customers should be critically consider for strategic informed decisions to be made as significant part of making markets perform effectively and efficiently in order to increase sales for the company (Communications Consumer Panel, 2010a). In view of this, long term regulatory strategy on a consumer champion should be carried out research to explore how consumers’ needs are likely to change and the role of vital communication services in matching those needs as an engine of growth for the company (Tambini, 2010).

### **CONCLUSIONS**

The current study buttresses the notion that research activity centered on operations management and theories continues to increase. The researchers considers as relevant to access where the research has been and where additional opportunities exist for improvement. As manufacturing faced with operations management to address the research topic by the operations managers which efforts have done to support the system. More specific opportunities have been proposed for future research on literature based classification on models and theories on operations management. This study focuses

on practitioners and academics with an overview of extant literature in this research topic as indicating opportunities for future research effort.

Several articles were studied across the operations theories and models applicable to manufacturing companies where most of the primary findings on the existing literature or approaches were narrowly defined aspects of the thought rather than considering a holistic view. In addition, whilst operations management existed, there should be the need to create awareness of development in other disciplines and looking for potential opportunities for coordination across the disciplines. It is my hope through the understanding of the extant literature and proposed research opportunities that were presented; the researchers has better been able to conduct operations management research that will help manufacturing companies and service organizations to address this significant matter.

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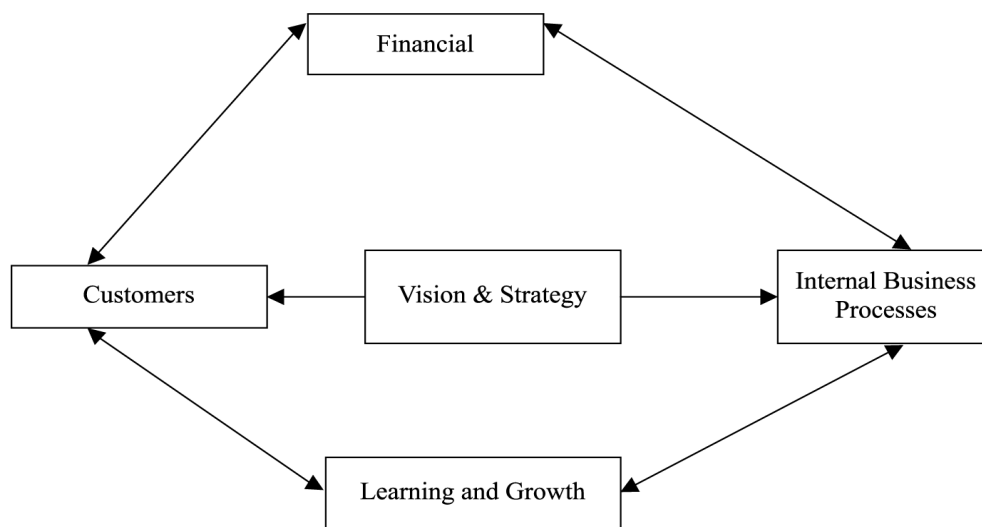
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## APPENDICES

The Balanced Scorecard



(Source: Meena Chavan, 2009, Basic design of a balanced scorecard performance system)

**Figure 1**

**Table 1: The Meaning of Just- In- Time**

Traditional Approach	JIT Approach
Focus on high capacity utilisation	Lower capacity utilization
More production at each stage	Focus on producing only when needed
More stoppages because of problems	Fewer stoppages
High inventory reduces the chance of the problems being exposed and solved	Low inventory so problems are exposed and solved
Extra production goes into inventory because of continuing stoppages at earlier stages	No surplus production goes into inventory

(Source: The Chartered Institute of Purchasing and Supply, CIPS)